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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/677,009	09/30/2003	John E. Dolan	SLA1195	7266
7590 03/15/2007 Scott C. Krieger Patent Counsel Sharp Laboratories of America, Inc. 5750 NW Pacific Rim Boulevard Camas, WA 98607			EXAMINER GE, YUZHEN	
			ART UNIT 2624	PAPER NUMBER
SHORTENED STATUTORY PERIOD OF RESPONSE			MAIL DATE	
3 MONTHS			03/15/2007	
			DELIVERY MODE PAPER	

Please find below and/or attached an Office communication concerning this application or proceeding.

If NO period for reply is specified above, the maximum statutory period will apply and will expire 6 MONTHS from the mailing date of this communication.

<b>Office Action Summary</b>	Application No. 10/677,009	Applicant(s) DOLAN ET AL.	
	Examiner Yuzhen Ge	Art Unit 2624	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☐ Responsive to communication(s) filed on \_\_\_\_.
- 2a) ☐ This action is **FINAL**.                      2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-13 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1,2 and 4-13 is/are rejected.
- 7) ☒ Claim(s) 3 is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 30 September 2003 is/are: a) ☐ accepted or b) ☒ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All    b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- |  |  |
|--|--|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)  | 4) <input type="checkbox"/> Interview Summary (PTO-413)<br>Paper No(s)/Mail Date. ____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)                                 | 5) <input type="checkbox"/> Notice of Informal Patent Application                      |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)<br>Paper No(s)/Mail Date ____ | 6) <input type="checkbox"/> Other: ____  |

## **DETAILED ACTION**

### ***Drawings***

1. The drawings are objected to under 37 CFR 1.83(a). The drawings must show every feature of the invention specified in the claims. Therefore, the steps claimed in claims 1-3 must be shown or the feature(s) canceled from the claim(s). For example, determining an extremum is not shown. No new matter should be entered.

Corrected drawing sheets in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. Any amended replacement drawing sheet should include all of the figures appearing on the immediate prior version of the sheet, even if only one figure is being amended. The figure or figure number of an amended drawing should not be labeled as "amended." If a drawing figure is to be canceled, the appropriate figure must be removed from the replacement sheet, and where necessary, the remaining figures must be renumbered and appropriate changes made to the brief description of the several views of the drawings for consistency. Additional replacement sheets may be necessary to show the renumbering of the remaining figures. Each drawing sheet submitted after the filing date of an application must be labeled in the top margin as either "Replacement Sheet" or "New Sheet" pursuant to 37 CFR 1.121(d). If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

### ***Claim Objections***

2. Claim 10 is objected to because of the following informalities. The word "colorbalance" should be separated into two words as "color balance" or written as "color-balance". Claim 9 is

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objected to because the last sentence recites “are closer to a reference illuminant than the extrema”. The examiner will interpreted as “are closer to a reference illuminant than the extrema”

***Claim Rejections - 35 USC § 112***

3. Claim 9 is rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. Claim 9 recites the limitation "the reference illuminant". There is insufficient antecedent basis for this limitation in the claim. The examiner will interpret it as “a reference illuminant”.

***Claim Rejections - 35 USC § 101***

4. Claim 13 is rejected under 35 U.S.C. 101 because the claimed invention is directed to non-statutory subject matter as follows. Claim 13 defines a set of executable instructions embodying functional descriptive material. However, the claim does not define a computer-readable medium or memory and is thus non-statutory for that reason (i.e., “When functional descriptive material is recorded on some computer-readable medium it becomes structurally and functionally interrelated to the medium and will be statutory in most cases since use of technology permits the function of the descriptive material to be realized” – Guidelines Annex IV). That is, the scope of the presently claimed a set of executable instructions can range from paper on which the program is written, to a program simply contemplated and memorized by a person. The examiner suggests amending the claim to embody the program on “computer-

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readable medium” or equivalent in order to make the claim statutory. Any amendment to the claim should be commensurate with its corresponding disclosure.

Currently in TC 2600, it is required explicitly to include "computer-readable medium", "encoded" (or “storing”, “embodied with a”, “encoded with a”, “having a stored”, “having an encoded”), and "computer program" in the claim language to make it explicitly a statutory subject matter.

***Claim Rejections - 35 USC § 102***

5. Claims 1-2, 4-7, and 9-13 are rejected under 35 U.S.C. 102(b) as being anticipated by Finlayson et al (Finlayson, G. D. Hordley, S. D., Hubel, P. M. “Color by correlation: a simple, unifying framework for color constancy,” IEEE Trans. Pattern Analysis and Machine Intelligence, vol. 23, pp 1209-1221, 2001, cited by IDS).

Regarding claim 1, Finlayson et al teach a method for estimating an image illuminant, the method comprising:

forming an illuminant set comprising data describing a plurality of candidate illuminants (Figs. 1 and 2, left column of Page 1212, Page 1213);

analyzing an image in relation to said plurality of candidate illuminants to determine a plurality of match scores for said plurality of candidate illuminants (Figs. 1 and 2, left column of Page 1212, the correlation values are the match scores, or  $\Pr(E/C_{im})$  on left column of Page 1213 is regarded as the match scores);

fitting a surface to said plurality of match scores, said surface representing illuminant values other than said candidate illuminants (right column of Page 1213 and left column of Page 1214, the likelihood function is a surface that fit to said plurality of match scores); and

determining a point on said surface, said point corresponding to the data representing a likely illuminant for said image (left column of Page 1214, Equations (14-16), the quality defined by Equation (16) is the likely illuminant).

Regarding claim 2, Finlayson et al teach a method as described in claim 1 wherein said illuminant set is a design matrix for a predetermined set of illuminants (Figs. 1 and 2, the illuminant set  $ill_1$ - $ill_8$  can be regarded as a design matrix for a predetermined set of illuminants, Pages 1212 and 1213).

Regarding claim 4, Finlayson et al teach a method as described in claim 1 wherein said analyzing comprises forming an image histogram of image element color coordinates relative to color coordinate distributions under said candidate illuminants (Equation (4), Figs. 1 (b) is an histogram, Section 3.1 Page 1214).

Regarding claim 5, Finlayson et al teach a method as described in claim 1 wherein said fitting a surface comprises a best-fit least squares method (bottom of left column and top of right column, Page 1218, the method of RMSE is equivalent to a best-fit least square method, Equations (14)-(15) define a surface also Equations (10)-(13) define a surface with  $E$  as the variable).

Regarding claim 6, Finlayson et al teach a method as described in claim 1 wherein said fitting a surface comprises taking a weighted average of the match scores of the candidate illuminants (left column of 1214, Equation (14) is regarded as a weighted average of the match scores of the candidate illuminants with weight equals to 1 for all candidate illuminants, left column of Page 1215).

Regarding claim 7, Finlayson et al teach a method as described in claim 1 wherein said determining a point on said surface comprises locating surface extremum (left column of Page 1214).

Regarding claim 9, Finlayson et al teach a method as described in claim 1 wherein said determining a point on said surface comprises solving for the color coordinates of an extrema on said surface and, choosing the point of the extrema when the coordinates of said extrema are closer to a reference illuminant coordinates than the closest candidate illuminant coordinates; or choosing the point of the closest candidate illuminant coordinates when the closest candidate illuminant coordinates are closer to a reference illuminant than the extrema (left column of Page 1214, the coordinate of the extrema obtained from Eq. (16) corresponds to a reference illuminant coordinate and the extrema is closest to the reference illuminant than other candidate illuminants because it coincides with the reference illuminant, also the illuminants with error bar are returned and thus enabling choosing of the one with maximum likelihood.

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Regarding claim 10, the term "candidate illuminants" in claim 1 are changed to "candidate color-balance corrections". A candidate illuminants corresponds to a candidate color-balance correction, which is the color constancy problem (abstract, 1<sup>st</sup> paragraph, right column of Page 1209, right column of Page 1218, Figs. 4 and 5, Table 1, of Finlayson et al), therefore Finlayson et al teach claim 10 as evidently described in the above passages.

Regarding claim 11, Finlayson et al teach a method for estimating an image illuminant, the method comprising:

forming a design matrix comprising the parameters of a plurality of candidate illuminants (Figs. 1 and 2, the illuminant set  $ill_1$ - $ill_8$  can be regarded as a design matrix for a predetermined set of illuminants, Pages 1212 and 1213) or the matrix of  $P_r$  under different illuminants can be regarded as the design matrix);

computing an image histogram comprising data relating the frequency of image element color values to color values found under said candidate illuminants (Fig. 1, the distribution is the histogram, also Page 1214, Equations (4), (16)-(17) and (20));

determining match scores for said plurality of candidate illuminants (Figs. 1 and 2, Pages 1212 and 1213);

fitting a surface to said match scores, said surface representing illuminant parameter values other than said candidate illuminants (left column of Page 1214, equation (14));

solving for an extremum of said surface (left column of Page 1214, Equations (14)-(15) define a surface also Equations (10)-(13) define a surface with  $E$  as the variable); and



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choosing the coordinates of said extremum as the parameters of an estimated image illuminant (left column of Page 1214, Equation (16)).

Claims 12 and 13 are the corresponding system and executable instruction claims of claim 1.

Finlayson et al teach a system and executable instructions (Section 4, to obtain results computer/system is used). Thus Finlayson et al teach claims 12-13 as evidently explained in the above-cited passages.

6. Claims 1 and 5 are rejected under 35 U.S.C. 102(b) as being anticipated by Brainard et al (Brainard, D.H., Freeman, W.T., "Bayesian color constancy," J. Optical Soc. Am. A, vol. 14, pp 1393-1411, 1997, cited by IDS).

Regarding claim 1, Brainard et al teach a method for estimating an image illuminant, the method comprising:

forming an illuminant set comprising data describing a plurality of candidate illuminants (right column of Page 1393, Section 2.A, Fig. 3, Fig. 2, shows the candidate illuminant on the horizontal axes, Section 3.A);

analyzing an image in relation to said plurality of candidate illuminants to determine a plurality of match scores for said plurality of candidate illuminants (Section 2.B, Page 1396, probability is regarded as the match score, Section 3.A);

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fitting a surface to said plurality of match scores, said surface representing illuminant values other than said candidate illuminants (Fig. 3, Section 2.B, Section 3.A, right column of Page 1399); and

determining a point on said surface, said point corresponding to the data representing a likely illuminant for said image (Page 1397, Section 3.A.3).

Regarding claim 5, Brainard et al teach a method as described in claim 1 wherein said fitting a surface comprises a best-fit least squares method (Equation (10) of Page 1397, Fig. 3, Appendix A).

***Claim Rejections - 35 USC § 103***

7. Claim 8 is rejected under 35 U.S.C. 103(a) as being unpatentable over Finlayson et al.

Regarding claim 8, Finlayson et al teach a method as described in claim 7. However they do not explicitly teach wherein said method of locating said surface extremum comprises forming derivatives of said surface and setting them equal to zero to locate surface extremum. They do define a surface with variable E (Equations (10)-(15), E is the variable, Pages 1213-1214). The examiner would like to take official notice that there is teaching in calculus on locating a surface extremum by forming derivatives of the surface and setting them equal to zero to locate surface extremum. It is desirable to find the extremum of a surface depending on the application using known methods in mathematics. Therefore it would have been obvious to one of ordinary skill in the art, at the time of invention, to use the method of calculus to locate a surface extremum by

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forming derivatives of the surface and setting them equal to zero in the method of Finlayson et al so that the extremum and therefore the best-fit illuminant can be found.

*Allowable Subject Matter*

8. Claim 3 is objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

The following is a statement of reasons for the indication of allowable subject matter. The prior art fails to teach the listed claims each of which specifically comprises the following listed feature(s) in combination with other limitations in the claim:

-- said illuminant set is a matrix of monomial basis functions in the color coordinates of each of said candidate illuminants.

*Conclusion*

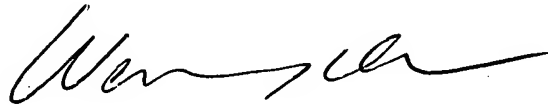
Any inquiry concerning this communication or earlier communications from the examiner should be directed to Yuzhen Ge whose telephone number is 571-272 7636. The examiner can normally be reached on 7:30am-4:00pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Bhavesh Mehta can be reached on 571-272-7453. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

Yuzhen Ge  
Examiner  
Art Unit 2624



**WENPENG CHEN**  
**PRIMARY EXAMINER**

2/13/07